WHAT IS CLAIMED IS:

1. A multi-channel system for sorting particles according to one or more characteristics of the particles, said system comprising:

multiple flow cytometry units each of which is operable to sort a desired population of particles in a mixture of particles by interrogating a stream of fluid containing said particles using a beam of electromagnetic radiation,

said units sharing an integrated platform comprising at least one of the following elements: (1) a common supply of particles; (2) a common source of electromagnetic radiation; (3) a common housing; (4) a common input for controlling operation of the units; (5) a common processor for receiving and processing information from the units; and (6) a common fluid delivery system for delivering fluid containing said particles to said flow cytometry units.

2. The system of claim 1 wherein said particles are cells.

3. The system of claim 1 wherein said particles are sperm cells.

4. The system of claim 1 wherein said system comprises at least element (2), and wherein one or more of said multiple flow cytometry units comprises a jet-in-air droplet sorting flow cytometry unit.

5. The system of claim 1 wherein said integrated platform comprises at least elements (2) and (3).

6. The system of claim 1 wherein said integrated platform comprises at least elements (4) and (5).

7. The system of claim 1 wherein said integrated platform comprises at least element (2), said common source comprising a single laser beam.

8. The system of claim 7 further comprising a beam splitting system for splitting the single laser beam into multiple beams and directing the multiple beams into optics systems of respective flow cytometry units.

9. The system of claim 8 wherein said single laser beam comprises a plurality of pulses, each pulse having a peak power that is greater than the average power output of the laser.

10. The system of claim 1 wherein said integrated platform comprises at least element (3), said flow cytometry units comprising interchangeable modules removably mounted in the housing.

11. The system of claim 1 wherein each flow cytometry unit comprises an epi-illumination optics system for interrogating a respective fluid stream.

12. The system of claim 1 further comprising a collection system for collecting said desired population of particles from each unit.

13. The system of claim 1 wherein said integrated platform comprises at least element (5), and wherein said common output comprises an indication of the fluorescence intensity measured by each unit.

14. The system of claim 1 wherein said integrated platform comprises at least element (5), and wherein said common output comprises an indication of the rate at which each unit is separating particles.

15. The system of claim 1 wherein said integrated platform comprises at least element (5), and wherein said common output comprises an indication of particle staining variations.

16. The system of claim 1 wherein said integrated platform comprises at least element (5), and wherein said common output comprises an indication of a decision boundary used by each unit for discriminating between particles.

17. The system of claim 1 wherein each of said flow cytometry units comprises a droplet sorting system.

18. The system of claim 1 wherein said integrated platform comprises at least element (5), and wherein said common output comprises an indication of a droplet break-off location of each unit.

19. The system of claim 1 wherein at least one of said flow cytometry units comprises a photo-damage system.

20. The system of claim 1 wherein at least one of said flow cytometry units comprises a fluid-switching sorting system.

21. The system of claim 1 wherein said flow cytometry units are adapted to operate in parallel.

22. The system of claim 1 wherein the integrated platform comprises at least a shared laser operable to emit a plurality of electromagnetic radiation pulses, wherein each pulse has a peak power exceeding the average power of the laser, and wherein one or more of said flow cytometry units comprises:

a flow channel for directing a fluid stream containing sample particles through a particle interrogation location;

a beam guidance system operable to direct a portion of the electromagnetic radiation in a pulse to the interrogation location;

a timing circuit operable to produce a timing signal indicative of the arrival of electromagnetic radiation at the interrogation location;

a detector adapted to detect electromagnetic radiation from the interrogation location and operable to output a time-varying analog signal indicative of the intensity of the detected electromagnetic radiation;

an analog to digital converter adapted to receive the time-varying analog signal as input and to sample the analog signal to produce a digitized output; and

an electronic processor operable to analyze the digitized output from the analog to digital converter as a function of the timing signal.

23. The system of claim 1 wherein the multiple flow cytometry units comprise three or more flow cytometry units.

24. The system of claim 1 wherein the multiple flow cytometry units comprise at least twelve flow cytometry units.

25. The system of claim 1, wherein the integrated platform comprises at least element (5), and wherein the common processor performs at least one of: (1) receiving and processing said information in real time; and (2) receiving and processing said information to permit evaluation of the operation of one unit relative to another unit.

26. The system of claim 1 wherein each flow cytometry unit comprises a sensor operable to generate a time-varying output signal indicative of at least one characteristic of the particles, wherein said integrated platform comprises at least element (5) and said information received by the common processor comprises the output signals from the respective sensors, and wherein the processor is operable to receive the output signals as a substantially continuous stream and to substantially continuously process the output signals in real time.

27. The system of claim 1 wherein said integrated platform comprises a common processor operable to send control signals to the flow cytometry units in real time during a sorting process to adjust their operation as a function of said information received by the common processor, and wherein the flow cytometry units are responsive to the control signals.

28. A multi-channel method of sorting particles according to one or more characteristics of the particles, said method comprising:

providing a plurality of flow cytometry units;

operating said flow cytometry units to conduct a plurality of flow cytometry operations, said operations comprising forming separate fluid streams each containing a mixture of particles, and sorting desired populations of particles in said mixtures of particles by interrogating the streams using beams of electromagnetic radiation; and

sharing at least one of the following elements while conducting said operations: (1) a common supply of particles for said streams; (2) a common source of electromagnetic radiation for said beams; (3) a common operations control input; (4) a common processor for receiving and processing information from the units; (5) a common system for delivering fluid to said streams; and (6) a common housing for said flow cytometry units.

29. The method of claim 28 wherein said particles are cells.

30. The method of claim 28 wherein said particles are sperm cells.

31. The method of claim 28 wherein at least one of said multiple flow cytometry units comprises a jet-in-air droplet sorting flow cytometry unit.

32. The method of claim 28 further comprising at least sharing said common source of electromagnetic radiation in the form of a single laser beam, said method further comprising splitting the single laser beam into multiple beams and directing the multiple beams into optics systems of respective flow cytometry units.

33. The method of claim 32 further comprising reflecting a percentage of beam light of the single beam toward the optics system of one of said flow cytometry units, and passing a percentage of beam light of the single beam for transmission to the optics system of another of said flow cytometry units.

34. The method of claim 32 further comprising using a solid state laser to form said single laser beam.

35. The method of claim 34 further comprising mode-locking the solid state laser so that the single laser beam comprises a plurality of pulses, wherein each pulse has a peak power that is greater than the average power output of the laser.

36. The method of claim 28 further comprising sharing at least element (6), and wherein said method further comprises removably mounting said flow cytometry units in the common housing.

37. The method of claim 28 further comprising at least sharing said common source of electromagnetic radiation in the form of a shared laser; the method further comprising the steps of:

emitting a plurality of electromagnetic radiation (EMR) pulses from a laser, wherein the peak power of each pulse exceeds the average power of the laser;

directing each pulse into a beam splitting and guidance system to intermittently illuminate each fluid stream and the particles contained therein by directing a portion of the energy in the pulses along a beam path from the laser to each interrogation location;

detecting EMR from at least one interrogation location;

generating a time-varying analog signal indicative of the intensity of the detected EMR from said interrogation location;

generating a timing signal indicative of the arrival of a pulse at said interrogation location;

converting the time-varying analog signal into a digital signal; and

analyzing the digital signal to determine characteristics of the particles in the fluid stream flowing through the respective interrogation location.

38. The method of claim 28 further comprising using a first sorting strategy in a first operation of said operations and a second sorting strategy different from the first sorting strategy in a second operation of said operations.

39. The method of claim 28 further comprising collecting a population of desired particles sorted by each flow cytometry unit, and combining the population collected from one unit with a population collected from a different unit to produce a blended population of desired particles.

40. The method of claim 28 further comprising varying the rate at which fluid is delivered to one or more of the flow cytometry units as a function of at least one of the following: (1) the purity of a first sorted population; and (2) the quantity of desired particles in a second population.

41. The method of claim 28 further comprising conducting said flow cytometry operations in parallel.

42. The method of claim 28 wherein the sharing step comprises sharing at least element (4), the method further comprising using the common processor to do at least one of the following: (1) receive and process said information in real time; and (2) receive and process said information to permit evaluation of the operation of one unit relative to another unit.

43. The method of claim 28 wherein the sharing step comprises sharing at least element (4), the method further comprising using a sensor for each respective cytometry unit to generate a time-varying output signal indicative of at least one characteristic of the particles and using the common processor to receive the respective output signals as a substantially continuous stream and to process the output signals in real time.

44. The method of claim 28 wherein the sharing step comprises sharing at least element (4), the method further comprising sending a control signal to one or more of the flow cytometry units in real time during a sorting process to adjust the unit's operation as a function of the information received by the common processor.

45. A multi-channel system for classifying particles according to one or more characteristics of the particles, said system comprising:

a plurality of flow cytometry units each of which is operable to classify particles in a mixture of particles by interrogating a stream of fluid containing said particles using a beam of electromagnetic radiation,

said units sharing an integrated platform comprising at least one of the following elements: (1) a common supply of particles; (2) a common housing; (3) a common input for controlling operation of the units; (4) a common processor for receiving and processing information from the units; and (5) a common fluid delivery system for delivering fluid containing said particles to said flow cytometry units.

46. The system of claim 45 wherein said integrated platform further comprises a common source of electromagnetic radiation.

47. The system of claim 45 wherein said particles are cells.

48. The system of claim 45 wherein said particles are sperm cells.

49. The system of claim 45 wherein said integrated platform comprises at least elements (3) and (4).

50. The system of claim 49 wherein said integrated platform further comprises a common source of electromagnetic radiation.

51. The system of claim 45 wherein said integrated platform further comprises a common source of electromagnetic radiation, said common source comprising a single laser beam.

52. The system of claim 51 further comprising a beam splitting system for splitting the single laser beam into multiple beams and directing the multiple beams into optics systems of respective flow cytometry units.

53. The system of claim 45 wherein said integrated platform comprises at least element (2), said flow cytometry units comprising interchangeable modules removably mounted in the housing.

54. The system of claim 45 wherein each flow cytometry unit comprises an epi-illumination optics system for interrogating a respective fluid stream.

55. The system of claim 45 wherein said integrated platform comprises at least element (4), and wherein said processor is operable to output an indication of the fluorescence intensity measured by each unit.

56. The system of claim 45 wherein said integrated platform comprises at least element (4), and wherein said processor is operable to output an indication of the rate at which each unit is separating particles.

57. The system of claim 45 wherein said integrated platform comprises at least element (4), and wherein said processor is operable to output an indication of particle staining variations.

58. The system of claim 45 wherein said integrated platform comprises at least element (4), and wherein said processor is operable to output an indication of a decision boundary used by each unit for discriminating between particles.

59. The system of claim 45 wherein said flow cytometry units are adapted to operate in parallel.

60. The system of claim 45 wherein said plurality of flow cytometry units are operable to sort the particles.

61. The system of claim 60 wherein the integrated platform further comprises a common source of electromagnetic radiation, and wherein said plurality of flow cytometry units comprises a jet-in–air droplet sorting flow cytometry unit.

62. The system of claim 45 wherein said integrated platform comprises at least element (4), and wherein the common processor is operable to perform at least one of the following: (1) receive and process said information in real time; and (2) receive and process said information to permit evaluation of the operation of one unit relative to another unit.

63. The system of claim 45 wherein each flow cytometry unit comprises a sensor operable to generate a time-varying output signal indicative of at least one characteristic of the particles, wherein said integrated platform comprises at least element (4) and said information received by the common processor comprises output the signals from the respective sensors, and wherein the processor is operable to receive the output signals as a substantially continuous stream and to process the output signals in real time.

64. The system of claim 45 wherein said integrated platform comprises a common processor operable to send control signals to the flow cytometry units in real time during a sorting process to adjust their operation as a function of said information received by the common processor, and wherein the flow cytometry units are responsive to the control signals.

65. A multi-channel method of classifying particles according to one or more characteristics of the particles, said method comprising:

providing a plurality of flow cytometry units;

operating said flow cytometry units to conduct a plurality of flow cytometry operations, said operations comprising forming separate fluid streams each containing a mixture of particles, and classifying particles in said mixtures of particles by interrogating the streams using beams of electromagnetic radiation; and

sharing at least one of the following elements to conduct said operations: (1) a common supply of particles for said streams; (2) a common operations control input; (3) a common processor for receiving and processing information from the units; (4) a common system for delivering fluid to said streams; and (5) a common housing for said flow cytometry units.

66. The method of claim 65 further comprising sharing a common source of electromagnetic radiation for said beams.

67. The method of claim 66 wherein said plurality of flow cytometry units comprises a jet-in-air droplet sorting flow cytometry unit.

68. The method of claim 65 further comprising operating said plurality of flow cytometers to sort said mixture of particles based on their classification.

69. The method of claim 65 wherein said particles are cells.

70. The method of claim 65 wherein said particles are sperm cells.

71. The method of claim 65 further comprising sharing a common source of electromagnetic radiation for said beams in the form of a single laser beam, splitting the single laser beam into multiple beams, and directing the multiple beams into optics systems of respective flow cytometry units.

72. The method of claim 71 wherein the sharing step comprises at least element (5), the method further comprising guiding said single laser beam into said common housing prior to splitting the beam.

73. The method of claim 71 further comprising reflecting a percentage of beam light of the single beam toward the optics system of one of said flow cytometry units, and passing a

percentage of beam light of the single beam for transmission to the optics system of another of said flow cytometry units.

74. The method of claim 65 wherein the sharing step comprises at least element (5), the method further comprising removably mounting said flow cytometry units in the common housing.

75. The method of claim 65 comprising operating each flow cytometry unit to interrogate a respective fluid stream using an epi-illumination optics system.

76. The method of claim 65 further comprising operating said flow cytometry units in parallel.

77. The method of claim 65 wherein said plurality of flow cytometry units comprise twelve or more flow cytometry units.

78. The method of claim 65 wherein the sharing step comprises sharing at least element (4), the method further comprising using the common processor to perform at least one of the following: (1) receive and process said information in real time; and (2) receive and process said information to permit evaluation of the operation of one unit relative to another unit.

79. The method of claim 65 wherein the sharing step comprises sharing at least element (4), the method further comprising using a sensor for each respective cytometry unit to generate a time-varying output signal indicative of at least one characteristic of the particles and using the common processor to receive the respective output signals as a substantially continuous stream and to process the output signals in real time.

80. The method of claim 65 wherein the sharing step comprises sharing at least element (4), the method further comprising sending a control signal to one or more of the flow cytometry units in real time during a sorting process to adjust the unit's operation as a function of the information received by the common processor.